



Designation: E 1058 – 85 (Reapproved 1997)

Standard Test Methods for the Toxic Contamination of the Environment in the Operator Enclosure of Self-Propelled Agriculture Vehicles¹

This standard is issued under the fixed designation E 1058; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These test methods may be used to determine the level of specific harmful airborne contaminants within a vehicle operator enclosure under standardized test conditions. The air exchange rate, air pressure relative to ambient conditions, air temperature, and relative humidity maintained within the enclosure during the test are also determined. Operator-introduced contaminants are not addressed by these test methods.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 SAE Standards:

SAE J726 Air Cleaner Test Code (for Fine Dust)²

SAE J1012 Recommended Practice Agricultural Equipment Enclosure Pressurization System Test Procedure²

2.2 NIOSH Standards:

NIOSH S318 Method for Xylene (Aromatic Hydrocarbons)³

NIOSH S327 Method for Formaldehyde (Aldehydes)³

NOTE 1—NIOSH P&CAM 354 may also be used.

NIOSH S340 Method for Carbon Monoxide³

NOTE 2—General Electric Carbon Monoxide Dosimeter with Support Console may be used.

NIOSH S370 Method for Malathion (Organic Phosphates)³
*NIOSH Manual of Analytical Methods*³

2.3 OSHA Standard:

OSHA Instruction CPL 2-2.20, Standard Methods for Sampling Air Contaminants⁴

¹ These test methods are under the jurisdiction of ASTM Committee E-35 on Pesticides and are the direct responsibility of Subcommittee E35.26 on Safety to Man.

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² Available from Society of Automotive Engineers, 400 Commonwealth Dr., Warrendale, PA 15096.

³ Available from National Institute of Occupational Safety and Health, 4676 Columbia Parkway, Cincinnati, OH 45226.

⁴ Available from Occupational Safety and Health Administration, 219 S. Dearborn, Chicago, IL.

*SKC Guide to NIOSH/OSHA Air Sampling Standards*⁵

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *aerosols*—small droplets of a liquid or particles of solid matter suspended in air, for example, a mist, fog, or smoke; droplets with $D_{v,5} \leq 50 \mu\text{m}$.

3.1.2 *airborne*—carried or suspended by air.

3.1.3 *air conditioning system*—a system that controls or alters the physical condition of air in or entering a specific space.

3.1.4 *air exchange rate*—the rate at which the air in a specific space is removed or replaced, or both.

3.1.5 *air filtering system*—a system for separating and removing undesirable contaminants from air as it is passed through the system.

3.1.6 *air intake*—the design area or opening through which air enters or is taken into a space or system.

3.1.7 *ambient conditions*—existing conditions in the surrounding area.

3.1.8 *breathing zone*—the zone surrounding and immediately in front of operator's face. Assumed to be directly above front edge of operator's seat and 1.2 m above floor of enclosure.

3.1.9 *closed operator enclosure*—a structure for enclosing or enveloping the operator that is sufficiently air-tight to permit modification of the environment within.

3.1.10 *concentration*—the relative content of a component in a mixture or solution.

3.1.11 *contaminant*—an undesirable component in any material or system.

3.1.12 *differential air pressure*—difference in the pressure exerted by air at a specific location relative to another selected location.

3.1.13 *droplet*—a small drop of liquid material.

3.1.14 *dust*—a fine grained particulate substance, suspendable in air, 90 % of which is capable of passing through a 44 μm (U.S. Standard 325 mesh) screen.

3.1.15 *dynamic test*—a test conducted while the test subject is undergoing specified motion.

3.1.16 *eye point*—the specified notional location of the operator's eye (Reference TC23/SC3).

⁵ Available from SKC, Inc., RD 1, 395 Valley View Rd., Eighty Four, PA 15330.

3.1.17 *forced air ventilation*—air ventilation which is created or aided by a forced movement of air as by a fan or blower.

3.1.18 *gaseous*—existing in the state of a molecular gas (< 0.001 μm particle size); containing no liquid droplets or solid particles.

3.1.19 *mists*—cloud-like aggregation of liquid droplets having a diameter of < 50 μm which are temporarily suspended in air.

3.1.20 *moving test (dynamic test)*—a test conducted while the test subject is undergoing specified motion.

3.1.21 *operator enclosure*—a structure intended for enclosing the operator.

3.1.22 *operator-introduced contaminant*—contaminant which is introduced by or as a result of actions of the operator (that is, as carried on operator's hands or clothing).

3.1.23 *particulate matter*—solid particles of material.

3.1.24 *primary filter (also particulate filter or fresh-air filter)*—a device used for filtering suspended mists and particulate matter out of intake air.

3.1.25 *rated air flow*—rate of flow of air in or through a system specified for designed performance.

3.1.26 *recirculating filter*—filter used for filtering the air which is recirculated within the operator enclosure (see *secondary filter*).

3.1.27 *relative humidity*—ratio of the vapor pressure of air divided by the saturation pressure at the same temperature.

3.1.28 *secondary filter*—filter located in a system where air in the enclosure is refiltered after passing through the primary filter (usually for recirculated air) (see *recirculating filter*).

3.1.29 *self-propelled agricultural vehicle*—an agricultural vehicle that has the capability of providing its own motive power.

3.1.30 *seat index point (SIP)*—reference point relative to the operator's seat as determined by a SIP measurement device.

3.1.31 *standard atmospheric pressure*—760 mm or 1013.2 millibars of pressure.

3.1.32 *static test*—a test performed while the test subject is stationary, in a fixed position.

3.1.33 *technical material*—the chemically active ingredient of a chemical solution or formulation.

3.1.34 *test media*—the materials being used to test the performance of a system.

3.1.35 *threshold limit value (TLV)*—time-weighted concentration of a material to which most workers can be exposed for 8 h per day over long periods of time without experiencing adverse effects.

3.1.36 *toxic ingredients*—specific ingredients in a solution or formulation that are considered to be toxic.

3.1.37 *toxic material*—poisonous materials having the ability to inhibit or destroy the life processes of living organisms.

3.1.38 *ultra-low volume (ULV)*—0.45 to 4.5 L per hectare.

3.1.39 *vapor*—matter in a gaseous state.

3.1.40 *vehicle*—a means in or by which something is carried or conveyed.

3.1.41 *ventilation system*—a system by which a space is provided with new or fresh air.

3.1.42 *volatile material*—material that vaporizes readily at

a relatively low temperature.

3.1.43 *volatility*—the relative tendency of a material to change physical state from liquid or solid to a gas as the temperature rises.

4. Summary of Test Methods

4.1 *Static (Laboratory) Test*—This test involves having the stationary vehicle housed in a sealed and insulated chamber. Air containing standard dust or chemical test media is passed through the chamber at various speeds, temperatures, and humidities, while the vehicle engine and air-filtering or air-conditioning system are operating. Automatic samplers are positioned inside and outside the operator enclosure to sample the air during the test interval. Analysis of these samples for the test contaminants provides a basis for determining the efficiency of the air-filtering or air-conditioning system for the operator enclosure.

4.2 *Dynamic (Field) Test*—This test involves monitoring the operator enclosure during normal field operations of the vehicle. Air sampling inside and outside the operator enclosure is carried out in a fashion similar to that used in the static test method. Analysis of the test parameters, vehicle speed and direction, ambient atmospheric conditions, operator enclosure environment, properties of the materials involved, sample analytical results, etc., provides a basis for determining the efficiency of the air-filtering or air-conditioning system for the operator enclosure.

5. Significance and Use

5.1 There are concerns about the potential for excessive exposure of the operators of self-propelled agricultural vehicles to toxic agricultural chemicals when transporting or applying these materials, or both. A need exists for suitable procedures for determining the amount of toxic chemical contaminants in the vehicle operator environment when official testing is required.

5.2 The purpose of these test methods is to provide a practical, reliable, and reproducible procedure for testing the performance of operator enclosure ventilating or air conditioning systems, or both, relative to the maintenance of safe environmental conditions with regard to toxic material contamination within the enclosure under static (laboratory) or dynamic (field) conditions, or both.

STATIC (LABORATORY) TEST

6. Test Facilities and Apparatus

6.1 Test Chamber:

6.1.1 *Dimensions*—The test chamber shall be large enough to contain the vehicle to be tested with a minimum of 1.0 m clearance on all sides and top of the vehicle being tested.

6.1.2 *Construction*—Insulate and seal the test chamber sufficiently to adequately maintain the physical conditions specified for the tests to be conducted. (While not essential, a turntable is recommended so that vehicle being tested can be quickly repositioned for different tests.)

6.1.3 *Chamber Pressure*—Provide the test chamber with a means for maintaining air pressure specified for the tests to be conducted.